Bird migration across the Himalayas

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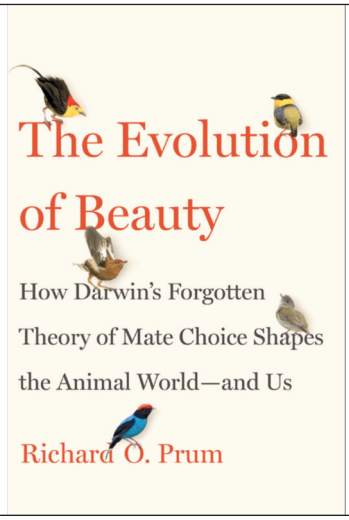
Prum R.O. 2017. The evolution of beauty. How Darwin's forgotten theory of mate choice shapes the animal world – and us. Doubleday, New York. 428 pp. ISBN 978-0-385-53721-6. €26.



Having explained, in the opening pages, the feelings of a serious birder when getting to know a new bird species, "connecting familiarity and personal experience to facts and understanding", Richard Prum goes on to argue that "we need an evolutionary theory that encompasses the subjective experiences of animals in order to develop an accurate scientific account of the natural world. We ignore them at our intellectual peril, because the subjective experiences of animals have critical and decisive consequences for their evolution". At this point it became clear to me that I was reading the work of an argumentative intellectual innovator, perhaps an intellectual dare-devil? Throughout reading his book, Prum gave me flushes of excitement by his recognition of capacities (in birds) and processes (in evolution) that certainly were not part of my university curriculum, but seem to make so much sense. "By recognizing sexual signals as beautiful to those organisms that prefer them – whether they are Wood Thrushes, bowerbirds, butterflies, or humans – we are forced to engage with the full implications of what it means to be a sentient animal making social and sexual choices."

So what is 'The Evolution of Beauty' about? It is about the puzzle of explaining the evolution of the huge diversity of sizes, shapes, sounds, plumages and 'extended' parts of the phenotype (bowerbird bowers, woven weaver nests, etc.) among the 10,000 species of birds (see Prum *et al.* 2015 for the most recent reconstruction of the evolutionary bush of birds since the demise of the dinosaurs at the end of the Cretaceous). It examines Darwin's second big idea about organismic evolution (Darwin 1871). In addition to 'natural selection' (the selective weeding of functionally poorer variants), he proposed an unrelated evolutionary force called 'sexual selection'. In Darwin's original formulation, sexual selection refers to the aesthetic choices for mates made by prospecting partners. Based on the perception and subjective evaluations by other individuals, in the mating game particular phenotypes gain an advantage over others because they are considered beautiful. Many such individual mating decisions then cumulatively shape the evolution of the phenotype.

In sexual selection, organisms act as the agents of their own evolution! Sexual selection implies three more things. (1) It gives the key role to the choosiest sex. (2) The pursuit of subjective experiences can lead to maladaptive mate choices (which will then be held in check by the other evolutionary force, 'adaptive' natural selection). And, (3) as the task of attracting a mate is so much more unconstrained and open-ended than the task of being a good forager and survivor in a particular environment, sexual selection will lead to phenotypes that are quirky, historically contingent, individualized and unpredictable (given a certain environmental context). "The result is the earth's nearly unfathomable variety of biological beauty."

The ideas that females are in the lead and that sexual selection can result in functionally maladaptive phenotypes did not sit well with Darwin's contemporaries. It still does not, and the past generation of evolutionary biologists has worked hard to subsume sexual selection as a category *within* adaptive natural selection. In this version, beauty is desirable because it signals true adaptive benefits such as health, vigour and good genes: beauty is an 'honest advertisement'. This is what so many ornithologists are trying to show today, probably with mixed success, and probably generating a literature biased towards confirmatory studies. It is ironic how all this work ignored a century of theoretical underpinning of Darwin's original version of sexual selection (Prum 2010, 2012).

Prum proposes that, instead of seeking confirmation for the adaptive features of mate choice, as is the case in contemporary evolutionary biology, studies of mate choice should always consider a null model to explain phenotypic extravagance. This null model, the

'Beauty Happens' hypothesis of the book, predicts the evolution of 'arbitrary traits that are neither honest or dishonest, indicate nothing other than mating availability, and lack any meaning or design other than their potential to correspond to mating preferences' (Prum 2010). This would provide a theoretical framework in which we would have to design tests to reject the null hypothesis, thus open-mindedly collecting support for adaptive explanations – currently the only accepted framework – , and work towards an unbiased scientific literature on the evolution of ornaments.

It was interesting to read, in a book on the origin of art (Rothenberg 2011), about the history and wider implications of Prum's ideas. It turns out that a tropical ear infection halfway through his career, put an end to Prum's reliance on hearing as his main observational tool and bird sound as his scientific focus of interest. Instead, he shifted gear to the visual world and started working on bird shapes, making fundamental discoveries on the evolutionary origin of feather design, including their colour patterning. This is very personal, and in the book he develops another theme which will be personal to almost all potential readers: mate choice and the evolution of human sexual dimorphic sizes, shapes and behaviours. For a 'feminist ornithology', and a gripping account on what it is like to be a female (and, indeed, a male) in monkey and ape societies, consult the chapters occupying the latter half of the book.

Of course, I tried to see how the Beauty Happens hypothesis could help me understand phenomena in my own field, the long-distance migration of shorebirds (Piersma *et al.* 2001). This includes the extreme variation in breeding plumages of males of one such long-distance migrant, the enigmatic Ruff *Philomachus pugnax*. Do the plumage variations of one behavioural phenotype, the resident male Ruffs (van Rhijn *et al.* 2014), 'simply' represent the arbitrariness of sexual selection sensu Darwin and Prum? The tension, or rather the eventual balance, between natural and sexual selection may actually show up in the design of cranes (Gruidae). Apparently, accepting that beauty happens, Jones & Witt (2014) suggest that longer migrations have led to the adaptive evolution of smaller body size, but that the force of sexual selection has selected for the particular beauty of their auditory signals. The outcome of these opposing selection forces has given the smaller crane species, i.e. those making the longest migrations, an elongation of their sound producing organ, the trachea.

'The Evolution of Beauty' was a thoroughly good and stimulating read. Sure, Prum delivers some strong advocacy here, which easily comes at a cost of bias, but I didn't mind so much considering what is at stake. It encouraged my growing conviction that biology should be ready to reinvent itself, and that this requires seriously looking afresh at the natural world from several different angles. I loved spending time with the book, and started missing it as soon as I was finished.

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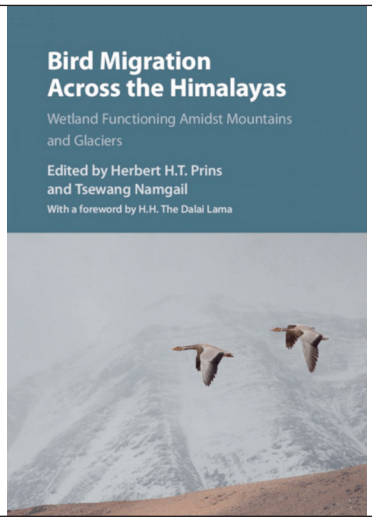
Prins H.H.T & Namgail T. (eds) 2017. Bird migration across the Himalayas. Wetland functioning amidst mountains and glaciers. Cambridge University Press, Cambridge. 440 pp. ISBN 978-1-107-11471-5. €82.



Between the vast taiga and the tundra of north central Siberia in the north and the lowland grasslands and wetlands of the Indian subcontinent in the south, the respective breeding and potential wintering areas of birds who count seasonal migration as their prime survival strategy, sits the 2400 km long Himalayan Mountain range. The shortest migration distance for these seasonal migrants would involve crossing the Himalayas, but with no route below 5500 m above sea level, they must contend with flights at very high altitudes. This book maps out the challenges that these migrating birds face and sketches some of the ways that they cope with them. The book, edited by the Dutch animal ecologist Herbert Prins and his Indian PhD student Tsewang Namgail, now director of the Snow Leopard Conservancy – India Trust, provides an eclectic mix of accounts of the birds, the geography of the Himalayas and the Tibetan plateau, and aspects of high altitude physiology and conservation of birds.

The book was clearly born out of passion and admiration for the region and for the birds there. The editors also convey that it was born out of frustration with the paucity of studies on bird migration across the Himalayas, and the scattered nature of the evidence. In this book no fewer than 58 authors take the readers through accounts on migratory routes (eight taxon-specific chapters summarizing the evidence for trans-Himalayan migrations), the 'physiography of the highest barrier on Earth' (five chapters on geomorphology, hydrology and vegetation), high altitude migration strategies (seven chapters on various ecological aspects of mountain crossings), people in the Himalayas (six chapters ranging from archaeology to Ramsar Convention criteria of wetlands), and finally a summary chapter on 'the need for better conservation and management of a natural wonder'. All the chapters are readable, but also a little idiosyncratic and technical, so I wished that the editors had endeavoured résumés of the chapters, telling us the gist of each in a standardized way. The previous synthetic work of McClure (1974), based on one of the largest ever focussed ringing study (1.65 million birds ringed), was cited in just two chapters and in one case as McLure.

As all I have seen of the Himalayas myself are distant airline views of the majestic peaks and valleys, I used the book to get a 'feel' for the place. The development of this 'feeling' relies on many different parts of the book, and the integrative maps of physical geography, migration flight patterns of birds and the photos (all usefully reprinted in colour in a separate section) help a lot. Nevertheless, this may be a book that will be consulted more at the chapter level than being read from cover to cover.

The satellite tracking studies on large species of geese, ducks, cranes and large raptors migrating across or around the Himalayan height barrier are usefully brought together in the opening section of the book. It is nice that these individual migrations set the scene. One gets the impression that, with the exception of many raptor species, the Himalayas may not be such an enormous barrier after all, or at least that it is being crossed by many migrating birds, some of which cunningly follow the passes and use the weather. What it would be like, to be a soaring migrant and cross the mountain range, is illustrated in two chapters written from the perspective of glider pilots. Klaus Ohlmann even gives advice to the birds: "If I were a 'gliding bird' and had to cross the Himalayas from India to Tibet, I would use the daily thermal development by starting etc." As a muscle-powered bird, Ohlmann would use his 'motor' (i.e. the muscles) "flying as low as possible, in order to avoid any extra effort and also the 'punishment' caused by lack of oxygen." This is exactly what Bar-headed Geese *Anser indicus* appear to do; during their seasonal migrations they hug the mountains (Hawkes et al. 2013).

The subtitle of the book, 'wetland functioning amidst mountains and glaciers', puzzles me, as this book is much more about the description of a geographic barrier, and its crossing by migrant birds, than about the functioning of habitats that birds stopping short could use during the crossing. Yes, there is a

chapter on the abundance of the macroinvertebrates in high altitude wetlands (a resource for waterbirds), and a chapter discussing whether migrants crossing the Himalayas should be concerned about their own safety from potentially predation by raptors (which misses citing the perhaps single most relevant reference by Thiollay 1979). A chapter on elevational gradients in bird diversity, implicitly sketches what 'wetland functioning' could yield in terms of avian summer visitors. Nevertheless, when it comes to conservation of the natural values of the Himalayas, birds that simply cross the 'barrier' high in the sky (just like airline passengers passing by at heights of 10 or 11 km) will be of least concern. The concerns are either with the birds that make a living on the mountains and the plateaus, make survival stops for shorter or longer times, or with the birds using the Central Asian Flyway in its entirety. These are the concerns developed in the last chapter; the editors hope that the book will help their conservation. This is also the message from the Dalai Lama, who in his foreword to the book states his hope "that this book … would help the readers to understand the lives of tens of thousands of birds across the Himalayas, and inspire them to extend their compassion towards other living species as well".

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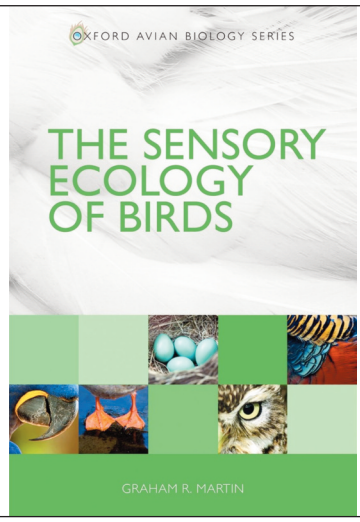
Martin G.R. 2017. The sensory ecology of birds. Oxford University Press, Oxford. Paperback, XVI + 296 pp. ISBN 978-0-19-969454. €40.99.



Each year millions upon millions of birds collide with glass, wires, cars and what not. These are the same organisms that use their acute vision to forage on tiny, well-hidden insects, avoid natural obstacles in the field, detect predators, migrate between continents and, in short, have survived several serious bottlenecks during their evolutionary past. Why then do these feathered jewels, endowed with such sensory capacities, apparently 'fail to see' wires or window panes? Are the senses of birds perhaps less superior than we think? Or not yet adapted to something which entered their world only very recently (especially seen in the light of the 350-million-year period since the camera type of eye – capable of spatial vision – evolved)? These and many other questions are tackled in the present, hugely informative yet entertaining, book. It can be, and indeed is, argued that the evolution of eyes changed the world for animals, and especially birds (for insects and their pheromones, another story could be told). The eye takes therefore pride of place with some 60% of the text devoted to the multifarious aspects of vision alone (birds are described as 'wings guided by an eye'). The other chapters are about touch, taste, hearing, olfaction and magnetoreception.

The senses of birds are described in great detail, but always mechanistically (i.e. describing what is possible/impossible given the limits set by, for example, lateral vision, photoreceptors in the retina, sound pressure levels, size and shape of olfactory bulbs, and so on). Comparisons are often made with the sensory capacities of humans, which brings home the message that

the world for birds is entirely different from ours. Fewer information is supplied about how exactly the senses are used in the field, in what ways limits set by physical properties are circumvented by simple solutions, such as constant turning of the head (improving the field of vision), switching between binocular and lateral vision, using a combination of senses (vision and touch, as in diving birds and during nocturnal foraging) and intimate knowledge of the territory (allowing flying 'blind').

In fact, as argued by the author, senses always constitute a trade-off, for example between sensitivity and resolution in vision. Only rarely is the perfect instrument really necessary (and this comes at a cost, as in very specialized birds like Oilbird, kiwi and Kakapo); in real life, a somewhat less perfect eye/ear/sense of smell suffices to cope with the environment (foraging, predator avoidance). It seems unlikely that, apart from some exceptions, birds put all their eggs in one basket, even though specialisations have occurred (vision in owls/nightjars, bills in waders, olfaction and sonar in Oilbirds). The economy of design is a strong principle in evolution (Piersma & van Gils 2011). The use of senses in concert, together with behavioural and physiological adaptations, make for high flexibility when facing the environment.

Anyone interested in birds should read this book. The complexity of the senses is bewildering and jaw-dropping. Whether this information can be used to make this human-dominated world a slightly safer place for birds is something else. Presumably not so much, but improvements sometimes come from unsuspected directions: casualties at lighthouses, a problem in the early 20th century, are now non-existent, because lighthouses are not used in navigation anymore. Perhaps, changes in technology will make windows or high tension wires just as obsolete. Until then, the celebration of senses as presented here is a most enjoyable read even without thinking about what it entails in terms of conservation. It completely changed my perspective on birds.

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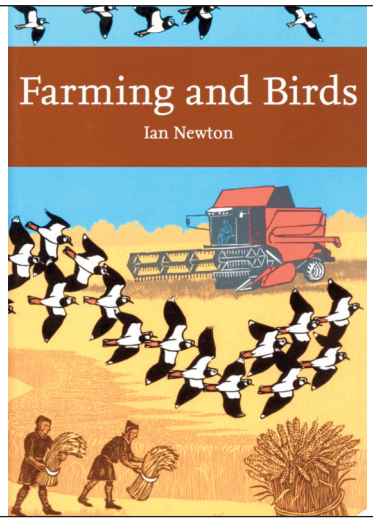
Newton I. 2017. Farming and birds. New Naturalist 135. Collins, London. Paperback, XII + 628 pp. ISBN 978-0-00-814790-7. €40.99.



In Britain, the tiny spot on Earth on which this book is based, agricultural development has been fast and furious in the past decades (and slow but no less furious in the past centuries). The story has been told before, but is here updated and examined in greater depth by an ornithologist (but not your average one). It is a must-read. For those who don't read anymore, or don't have a strong stomach, start with the concluding remarks of the last but one chapter (2 pages) and concluding chapter (11 pages); the conundrum in a nutshell, boiling down to overpopulation.

The negative impact of agriculture on all the land 'from sea coast to mountain top', and how it came about, is unfolded step by step. A horror story if ever there was one, in which the individual farmer intent on improving land within the limits set by soil, hydrology and climate (preferably leaving it in a better condition for the next generation) is transformed into a subsidy-addict (on average 15.000 British pounds per year, but with a large discrepancy between upland and lowland farmers), wasting the land and water in favour of agro-industrial stakeholders intent on making money. Farmers have become the playthings of a rapidly changing world that reduces both their autonomy and the land's biodiversity. This was a slow process at first, boosted during World War II – self-sufficiency needed with Germany's grip on the continent – and then step-changing into a government-aided, cash-driven affair, costing 3.2 billion pounds per year, with associated water pollution, greenhouse gas emissions, soil erosion, flooding, and deteriorating public health from exces-

sive agri-chemical use (adding an extra cost of 2.3 billion pounds per year). These costs are met by society at large, whereas profits end up in the pockets of the agri-industry. It must be economic heaven for the industries involved, which is exactly why they will do whatever they can to keep the status quo. Altogether, it costs two-thirds as much to deal with the environmental consequences of modern farming as to support it, not to mention that "environmental damage is often permanent or not reparable on normal time scales". When a *government* commission concludes that "the agricultural industry has become dysfunctional – unsustainable in every sense, detached from the rest of the economy, and also from the environment, which it continues to degrade" you know it is bad, real bad. Incredible as it may seem, it continues as we speak, on about 70% of the land worked by only 1% of the adult population, and negatively affecting 100% of the surface area (including nature reserves, the majority of which are a 'paper nature reserve' anyway, i.e. Sites of Special Scientific Interest) and all people. This crying shame is not typical of Britain alone, but of Western Europe at large (Bezzel 1982, Flade *et al.* 2003), exported to southern Europe in the 1980s and spreading into eastern Europe with the expanding EU and its associated dysfunctional agricultural policies (George 2004) and into the rest of the world. The poison cup is not empty yet, not by a long shot.

Newton describes the changes in, and impact of, farming in great detail, not only for birds but also for the soil and its inhabitants, the vegetation, and the arthropods, separately for the various types of grassland and arable land, for uplands, wetlands, woodlands and heaths. Birds have been particularly well studied and monitored, for sometimes 'long' periods of time, which makes this group particularly suited to demonstrate changes in the past decades, even centuries. But it should be noted that birds constitute only a tiny portion of the total biodiversity. Although declines of most birds associated with farmland are 50% or more (some >90%, as Turtle Dove *Streptopelia turtur*, Grey Partridge *Perdix perdix*, Corn Bunting *Miliaria calandra* and Tree Sparrow *Passer montanus*) in recent decades, declines in organisms lower down the food chain are likely more severe. Unfortunately, they have received less attention because most have not been studied, and very few are being monitored, the Rothamsted Insect Survey being a notable exception. Bird declines were in many cases closely linked with changes in farming practices, exemplified via experiments (especially regarding arable land and granivorous birds, with pride of place for Skylark *Alauda arvensis*, finches and buntings), but also clearly indicated via circumstantial evidence. The latter, for example, is evident in the House Martin *Delichon urbicum*, a species taking small insects at higher altitudes, which has conspicuously declined in the southeast of Britain (intensive agriculture, cattle gone from most farms) but less so towards the north and west where agriculture is less intense (see also Willow Warbler *Phylloscopus trochilus*). Many such examples are littered across the text, based on the wealth of research from Britain and sparingly augmented with data from mainland Europe (where variations on the same theme abound). Think of a bird species in any kind of habitat, and the chances are pretty good that farming had its say in trends (also when upwards, as in geese, for example). The scale, scope and speed of changes are difficult to comprehend and the statistics in Newton's book are a welcome reminder of what we have lost. This reminder is important, for our perception of the world changes with each new generation (p. 565: "each generation working within the cramped confines of remembered baselines"); who pines for the pre-war world except the dying breed that was born and raised in those days? This message is effectively exemplified by Newton's quote from 19th century poet John Clare, who protested bitterly at the hedge planting (destroying the open field system; in fact the same diatribe is made by 21st century Dutch Montagu Harrier aficionados), the landowning Chandos Wren Hoskyns (1857) even going as far as to describe hedges as "hideous and useless strongholds of roots, weeds, birds and vermin". Mind you: British hedges nowadays are highly valued and – under strong pressure from the public – considered worth preserving. It is subtle interludes and perspectives like these that makes 'Farming and birds' such a splendid read in spite of the heart-rending litany of loss.

Is there no way out? Newton is among those who see a glimmer of hope, for example via agri-environmental schemes, or whatever they are called nowadays, and despite their general ineffectiveness (see also Newton 2017). Interestingly, in 'Farming and birds', Newton puts those efforts in full perspective, i.e. subsidy-dependent (hence inherently ineffective; Brexit will be a nice litmus test in this regard, for the EU pressure to preserve diversity in farmland will disappear), highly selective (birds themselves are already a tiny speck within the diversity of life, let alone the few bird species attracting the conservationist's attention), and even destructive (measures favouring species X will degrade the environment for other species; in this respect I was a bit shocked to read that even Newton

considers predators an increasing problem which may merit 'management'). Perhaps it is time to think entirely different, away from cash-driven initiatives that are doomed in the long run anyway? Setting aside half of the earth, for example, as proposed by E.O. Wilson (2016), or giving free reign to nature where possible (even when it doesn't result in what we – man – think of as worth preserving). We might be in for a surprise (Goulson 2017). Meanwhile, let's hope that our (western) conservation efforts do not result in the export of destructive ways of food production to the oceans, South America, Africa or Asia.

This book was a tremendously rewarding and stimulating read. Never a dull moment in 600+ pages. It will also make you think about your childhood, way of life and the vote you cast.

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